

Nitrogen generator model: ZEFIRO 40/35/25/20/8 HP

User's manual

Version 2.07



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Introduction

Scope of the manual

This manual provides operation and maintenance instructions for model ZEFIRO 35/25/20 nitrogen generators.

Specifications

Specifications of the nitrogen generator

| | | |
|--|--|---------------------------|
| Standard nitrogen flow rate | 40 l/min@8 bar at STP (*) for ZEFIRO 40 35 l/min@8 bar at STP (*) for ZEFIRO 35 25 l/min@8 bar at STP (*) for ZEFIRO 25 20 l/min@8 bar at STP (*) for ZEFIRO 20 8 l/min@4 bar at STP (*) for ZEFIRO 8 HP | |
| Outlet pressure | 4 to 8 bar (101 to 116 psi) | |
| Standard purity | 98% to 99% at STP (*), 500 ppm at STP (*) for Zefiro 8 HP | |
| Available flow rates range | 8 to 50 l/min (depending by the purity) | |
| Input voltage | 110 V / 60 Hz | 230 V / 50 Hz |
| Weight | 142 kg | 135 Kg |
| Power consumption | 1800 W | |
| Fuse | N.1 6.3x32 mm, 20 A, type F | N.2 5x20 mm, 10 A, type F |
| Pressure accuracy | 0.1 bar (± 0.5 %) | |
| Microprocessor controlled display | Graphic display, 128 x 64 pixels | |
| Index of protection | IP2x | |
| Operating conditions: - Temperature - Relative humidity | 15 °C to +35 °C 0-80%, non condensing | |
| Over voltage category | II | |
| Pollution degree | 2 | |
| Sound pressure level | < 65 dB(A) | |
| Alarm relays | 250 VAC, 12 A max | |
| Output port | G1/4 | |
| Case dimensions | 482 x 835 x 641 mm (WxDxH) | |

(*) STP: Standard temperature and pressure (20 °C, 1 bar)

Notes on FCC compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance

with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING!

Any changes or modifications to this equipment not expressly approved by the manufacturer may void the user's authority to operate the equipment.

Correct use

Nitrogen generator is designed to produce nitrogen for laboratory use. The unit must only be operated for this purpose, according to the specifications and instructions provided in this manual. In particular, the following warnings must be observed at all times:

- **Indoor use only!**
- **Never operate the unit in below-zero temperatures!**
- **Only operate the unit in a room with sufficient ventilation (see “Placing the unit”)!**
- **Always unplug the unit from the mains power supply before accessing the internal components for replacement!**
- **Only the parts described in the “Spare parts list” can be replaced by the user!**

Health and safety

Correct use of the ZEFIRO nitrogen generator is important for your personal safety and for trouble-free functioning of the ZEFIRO. Incorrect use can cause damage to the ZEFIRO or can lead to incorrect gas supply.



Warning!

- Read this manual before you start the installation and putting into operation of the ZEFIRO. Prevent accidents and damage to the ZEFIRO.
- Contact your supplier if you detect a problem that you cannot solve with this manual.
- Only service-engineers, that are qualified to work on electric and pneumatic equipment, are allowed to do the installation, maintenance and repairs. Unqualified people are not allowed to repair the equipment. Lift the ZEFIRO with a forklift. Follow the legislation and instructions for operating the forklift.
- **Do not tamper or experiment with the equipment. Do not exceed the technical specifications for the ZEFIRO.**



Warning: nitrogen and oxygen!

The ZEFIRO generates nitrogen as a product. Oxygen enriched air is released as waste.

- **Nitrogen can cause suffocation!**



- Oxygen-enriched air leads to increased risk of fire in the event of contact with inflammable products. Make sure that there is adequate ventilation at all times!
- The ZEFIRO is not designed for installation in an Exx-classified area.
- Do not install the ZEFIRO in an area where explosive mixtures may occur.

Warning: electricity



- Only service-engineers, that are qualified to work on electric equipment, are allowed to do the installation, maintenance and reparations.
- Disconnect the main power supply before you do the maintenance or repair.
- If a service-engineer has to work on the ZEFIRO while the electric power it is connected, the service-engineer must be very careful with respect to the electric hazards.

Warning: safety precautions



- Make sure that the ventilation rate is sufficient in the room where the enriched oxygen is ventilated, or lead the enriched air outside.
- **Keep the ambient temperature between 10 and 35 °C.**
- Install the peripheral equipment, piping and nitrogen storage vessels according to standard procedures.
- Do regular maintenance to the ZEFIRO.

Packing list

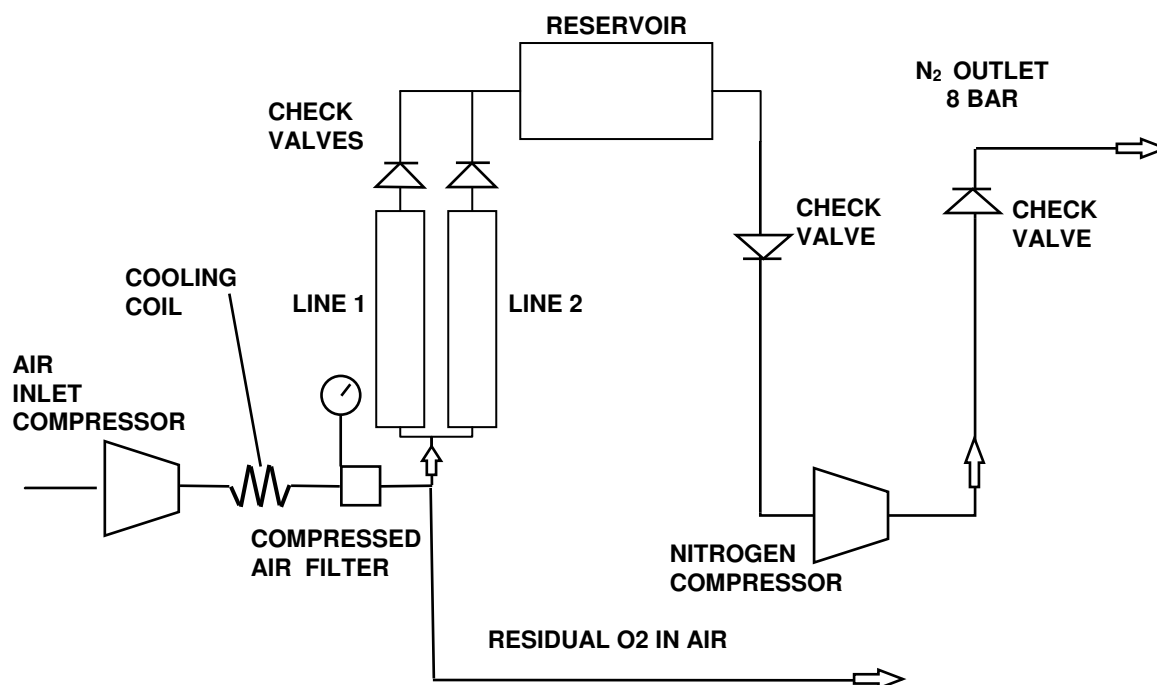
List of items included in the shipment

| Quantity | Description |
|----------|--|
| 1 | Nitrogen generator |
| 1 | Instruction manual (cd format, pdf file) |
| 1 | Power cable |

Description

The nitrogen generator produces pure nitrogen through the filtration of compressed air. The key element of the generator is a carbon molecular sieve that is able to separate the nitrogen molecules from the oxygen ones present in the compressed air stream. The carbon molecular sieve tubes are self regenerating cyclic. The compressors are integral in the generator and their purpose is to compress air up and force it into the tubes containing the carbon molecular sieve.

The generated nitrogen gas is accumulated in a specific reservoir. The internal pressure is controlled by a pressure transducer. The outlet pressure is controlled by a proportional valve. The nitrogen then passes through outlet port at the rear.



(*) The 'nitrogen compressor' is not placed in the Zefiro 8 HP (there are only the 'air inlet compressors')

Installation

Receiving the generator

All units have been carefully inspected before transport. Visual checks for damage and functional tests should be performed upon receipt. Any damage must be immediately noted and reported. The generator must only be returned according to the shipping instructions provided.

Placing the generator

The nitrogen generator must be placed on a flat, level, vibration-free, shock-free surface. Do not place the generator over a source of heat, as this may cause the device to overheat. The unit should not be in contact with any other objects on any side, and the air inlet must not be blocked. **Leave at least 30 cm of free space at rear for ventilation.** Do not operate the generator in a sealed or unventilated room. Do not operate the generator at below freezing temperatures. **Operation is guaranteed at operating temperatures between +15 and +35 °C.**

WARNING!

*Normal precautions for any nitrogen supply should be taken when using the generator.
DO NOT use in sealed or unventilated rooms. Nitrogen can cause suffocation.*

Symbols used on the generator



Earth symbol:

This symbol marks the earth connections to the chassis of the nitrogen generator.



Electrical shock:

This symbol marks the risk of electrical shock.

Gas connections

Pure nitrogen at regulated pressure is available at the nitrogen outlet port at the rear of the generator. This port has a thread of 1/4 and pressure at this port is shown on the display.

WARNING!

The line from the relief port should never connect in such a way that back pressure can develop.

Initial start-up

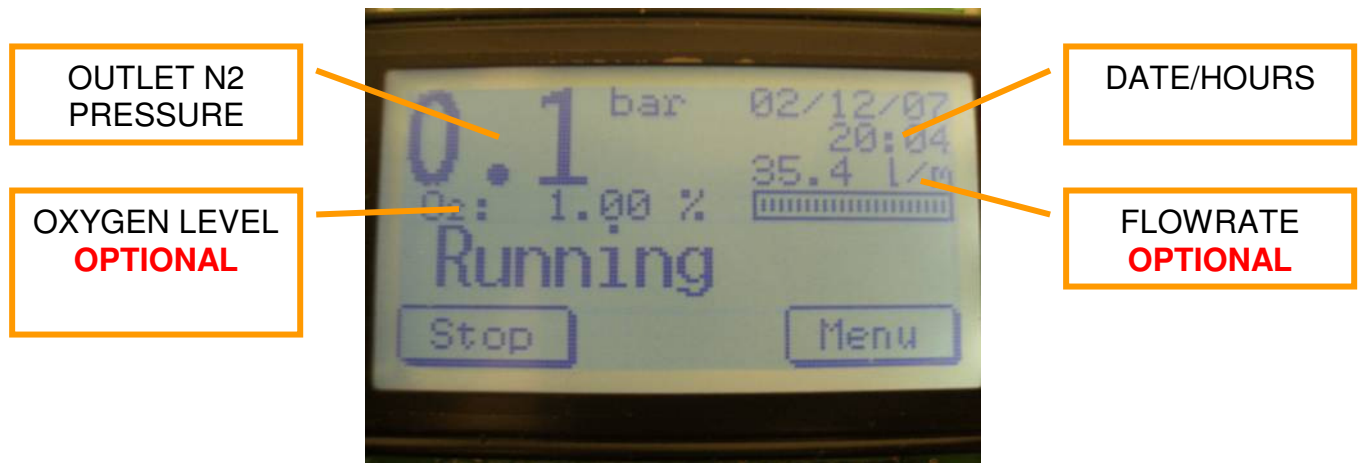
Start the generator

- Switch on the unit.
- Press start.
- It will be at least 20 minutes before the nitrogen produced will reach the stated purity (In the Zefiro 8 HP it is necessary to wait 90 minutes).
- The system is ready for use now.

Operation

The operating status of the unit is shown on the main screen on the graphic display. It is possible to see the outlet pressure level of 8 bar on the display when the generator is connected to its applications.

The main screen has three options at the bottom, corresponding to the three buttons on the unit, which are used to run the various functions and access the configuration and diagnostics of the unit.



In the main screen, the three buttons have the following function:

Left button: start/stop;

Central button: reset the alarms;

Right button: enter menu;

In the menu, the three buttons change their function:

Left button: scroll;

Central button: select;

Right button: exit the selected menu voice;

Menu structure

Parameters

| Item | Description | Options / Range | Default |
|--------------------|--|-----------------|---------|
| Pressure units | Sets the desired unit of measure for the pressure | bar / kPa/ psi | bar |
| Temperature units | Sets the desired unit of measure for the temperature | °C/°F | °C |
| Flow units | Sets the desired unit of measure for the flow rate | l/min-scf/min | l/min |
| Auto start | Sets whether the unit automatically starts production when power is switched on. | YES / NO | NO |
| Display contrast | Sets the desired contrast of the display | 1-10 | 5 |
| Beeper | Sets the alarm beep on/off | YES/NO | YES |
| Pre-alarms in list | Sets the possibility to see the pre-alarms in the alarm history list | YES/NO | NO |
| Standby Mode | Activated only for the external tank | YES/NO | NO |

Diagnostic

| Item | Description |
|------------|--|
| Sec1 temp | Shows the instant temperature in the section 1 of the cabinet |
| Sec2 temp | Shows the instant temperature in the section 2 of the cabinet |
| Out Pres. | Shows the instant output pressure |
| S#1 Pres. | Shows the instant pressure in the internal reservoir |
| Tank Pres. | Shows the instant pressure in the external tank (if installed) |
| Oxygen | Shows the instant oxygen content (only if the optional O ₂ analyzer is installed) |
| WT CMP | Shows the work time of the compressor |
| SRV 4000 | Shows the work time for the 4000 h service |
| SRV 8000 | Shows the work time for the 8000 h service |

Alarm history

Shows the history of the alarms occurred on the unit.

Set clock

Allow the regulation of the clock of the unit. The central button of the display increases the values and the left button passes to the next number.

Special function

Allow the activation of some special function (i.e. the reset of the working time counter of the filter) with the digitations of a code. The central button of the display increases the values and the left button passes to the next number.

MENU-SPECIAL FUNCTION-CODE-SCROLL

Codes:

- **Reset of the compressor CO1 counter:** 26101
- **Reset of the compressor CO2 counter:** 26102
- **Reset of the 4000 h work time counter:** 26103
- **Reset of the 8000 h work time counter:** 26104

Pre-alarms and alarms

There are a series of pre-alarms and alarms on the unit. When a pre-alarm starts, a sound advertise about a problem and the type of problem is displayed on the main screen. When an alarm starts, the unit also stops.

What do they mean and how to proceed:

Pre-alarms

- **Max pre-alarm cabinet temperature:** the temperature inside the cabinet is over the maximum limit. Check if the room temperature respects the specifications and if there is enough space in the rear side of the unit for the ventilation. Otherwise, remove the right panel of the machine and the cabinet panel and check if all the fans are working. If it is all right, call the service. Press the reset button.
- **Min pre-alarm press. section 1:** the pressure in the internal reservoir is less than the lower limit. Call the service. Press the reset button.
- **Max pre-alarm oxygen (only if the optional oxygen analyzer is installed):** the N₂ purity is decreasing. Call the service. Press the reset button.
- **Work time pre-alarm compressor:** the compressors must be changed. Call the service. Press the reset button.
- **Pre-alarm service 4000 h:** the filter must be changed. See the maintenance section of this manual relatively to the 4000 h service kit. Call the service to order the new kit. Press the reset button.
- **Pre-alarm service 8000 h:** the filter and the silencer must be changed. See the maintenance section of this manual relatively to the 8000 h service kit. Call the service to order the new kit. Press the reset button.
- **Pre-alarm clock failure:** the clock is broken. Call the service. Press the reset button.

Alarms

- **Max alarm cabinet temperature:** the temperature inside the cabinet is too high.
- **Min alarm press. section 1:** the pressure in the internal reservoir is too low.
- **Max alarm press. section 1:** the pressure in the internal reservoir is too high. Check if the output fitting is free. If it is all right, call the service.
- **Min alarm press. outlet:** the outlet pressure is too low.

- **Max alarm press. outlet:** the outlet pressure is too high. Check if the output fitting is free. If it is all right, call the service.
- **Max alarm oxygen (only if the optional oxygen analyzer is installed):** the N₂ purity is over the maximum limit.
- **Work time alarm compressor:** the compressors must be changed.
- **Alarm service 4000 h:** the filter must be changed. See the maintenance section of this manual.
- **Alarm service 8000 h:** the filter and the silencer must be changed. See the maintenance section of this manual.
- **Alarm EEP failure:** failure of the static memory. Call the service.

Flow control (not presents in the ZEFIRO 8 HP)

If the costumer requires less flow than 35-25-20 l/min at 8 bar nitrogen generator will run continuously and the exciding part of nitrogen will be blow away by a valve inside the machine.

If costumer wants to install an external tank (100 liters as minimum volume required) it is possible to connect it in the outlet of generator. Before installing the tank make the following operations:

- The generator must be running at standard way (35-25-20 l/min at 8 bar);
- Enter the *menu*, go to *parameter* and change the *stand-by mode* option from *no* to *yes*;

MENU-PARAMETER-STANDBY MODE-YES

Using the *stand-by mode* the generator will stop when the tank reach the maximum pressure of 8 bar and will restart at the minimum level of 7 bar.

The standard value of the maximum pressure that can be reached in the tank is 8 bar while the minimum is 1 bar. In case other pressures are needed, call the service.

If costumer wants that the *generator stops automatically* going in the *stand-by* mode when the applications doesn't requires nitrogen there is the possibility to install (as an optional) the *flowmeter*. In this way the generator will go in stand-by mode when the flow of nitrogen required by the application is 0.0 l/min (at 8 Bar) and will restart when the pressure in the line goes under the 3 Bar.

The generator can stay in stand-by mode for 48 hours. After this time the generator restarts and if application is still closed the generator goes in stand-by mode for other two days.

Maintenance

With proper care and maintenance, your nitrogen generator should provide you with years of trouble-free operation. There are no adjustments to be made to the generator. The only routine service operations are those described below.

Nonetheless, the generator should be inspected approximately every 2 years. Contact your supplier.

Routine maintenance

The following section describes the maintenance operations required for the correct operation of the nitrogen generator.

Cleaning

The internal components of the nitrogen generator do not need to be cleaned and should not be accessed by the user for cleaning. To clean the outside of the unit, only use a damp cloth (no detergents, acids or aggressive or abrasive substances).

Service kits

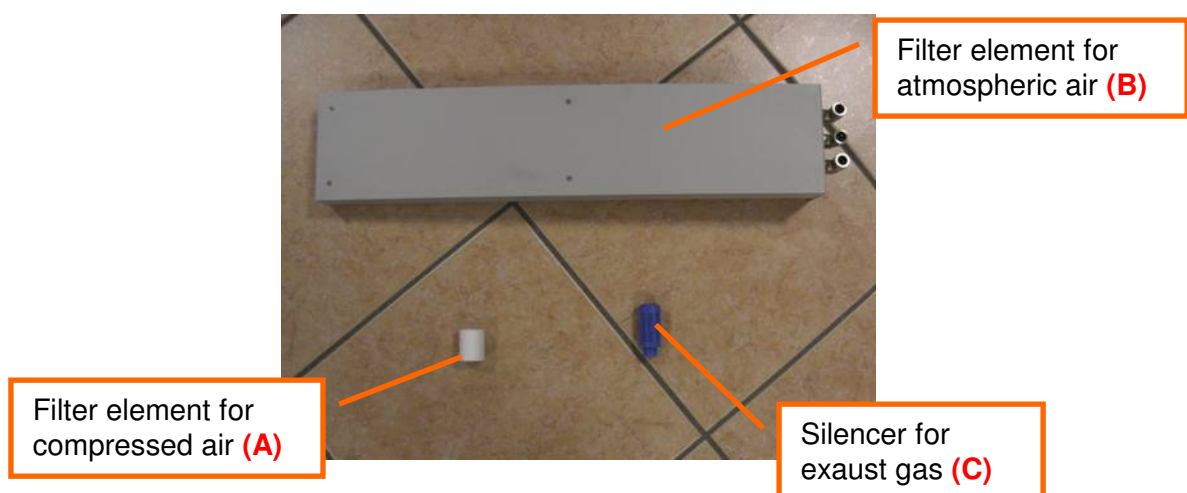
The service kits in the Zefiro generators are every 4000h. The first starts at 4000h, the second at 8000h and using the reset codes the cycle repeats.
The Service kit is composed by:

- 1- Filter element for compressed air (A).
- 2- Inlet filter for atmospheric air, the internal sponge (B).
- 3- Silencer for exhaust gas (C).

For Zefiro 20/25/35/40 the services kits 4000h and 8000h are composed by:



For Zefiro 8 HP the services kits 4000h and 8000h are composed by:



Difference between Zefiro 20/25/35/40 service 4000h-8000h and Zefiro 8 HP service 4000h-8000h:**WARNING!**

Only qualified personnel should perform service on this product. Any damage done to this product as a result of improper maintenance procedure will void the warranty.

4000 hours service kit

-ask to service the code Z03-4000 for Zefiro 20/25/35/40

-ask to service the code Z06-4000 for Zefiro 8 HP

Every 4000 hours the user must replace some parts of the generator.

A specific maintenance kit is available as spare part. This kit includes all required parts.

Specifically, each kit includes:

1. New filter element for compressed air (A).
2. New inlet filter for atmospheric air (B).
3. New silencer for exhaust gas (C).

1. Exchange the filter element for compressed air (A)

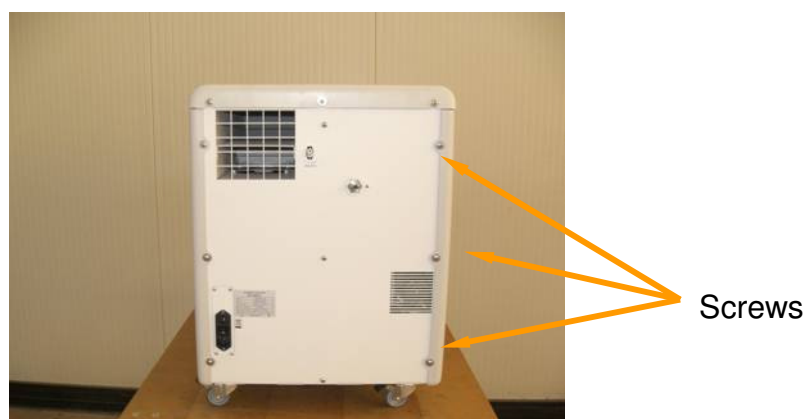
- switch off the instrument and disconnect it from the power line;
- unscrew partially the two bottom screws of the front panel with the wrench;



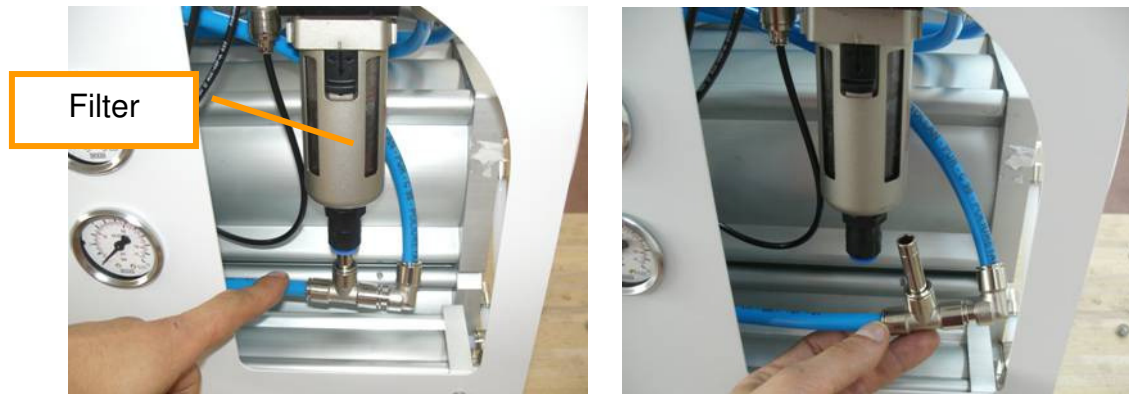
- remove the front panel;
- unscrew partially the three bottom screws of the left side panel with the wrench;



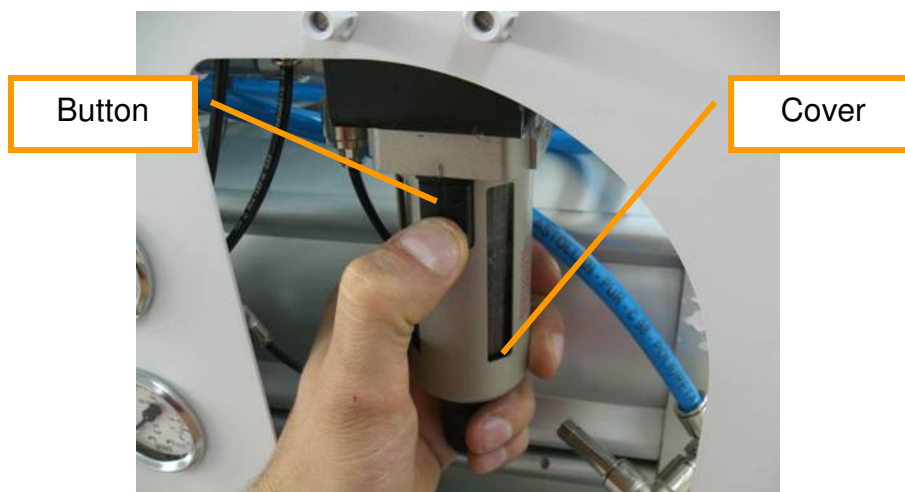
- unscrew the three rear screws of the side panel and remove the panel;



- In the left part of generator it is possible to find the air inlet filter;



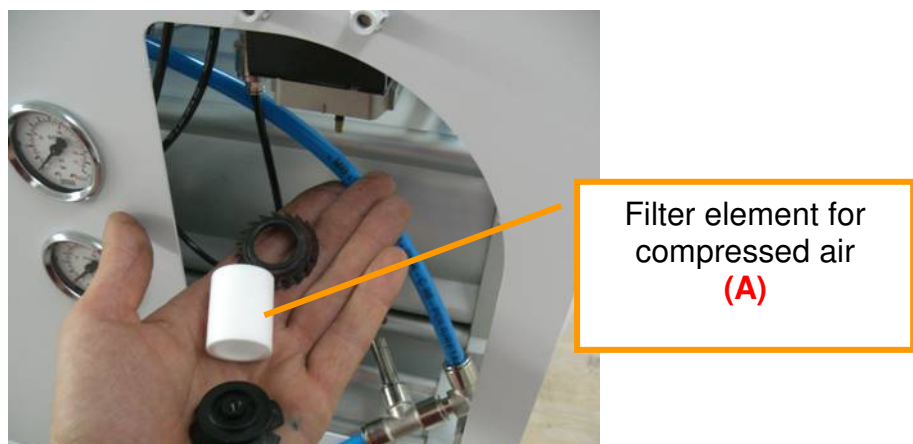
click the button, rotate the cover of 1/8 turn in a left-hand direction and then push it in the bottom direction;



NOTE

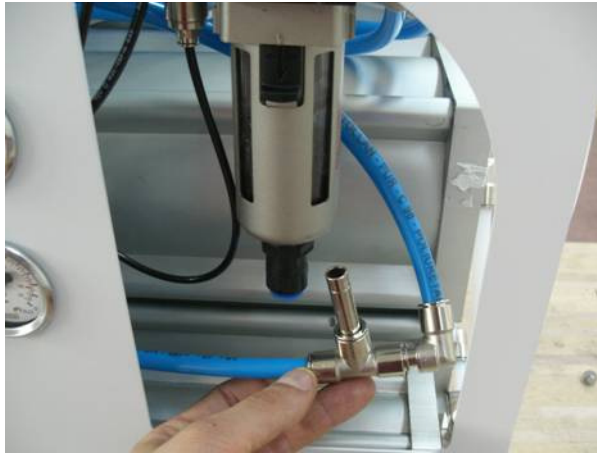
If the cover of the filter is difficult to remove, probably there is still pressure inside it. To solve the problem, unscrew partially the bottom cap of the cover until the internal pressure reach the ambient pressure.

- unscrew the filter element and replace it with the new one;

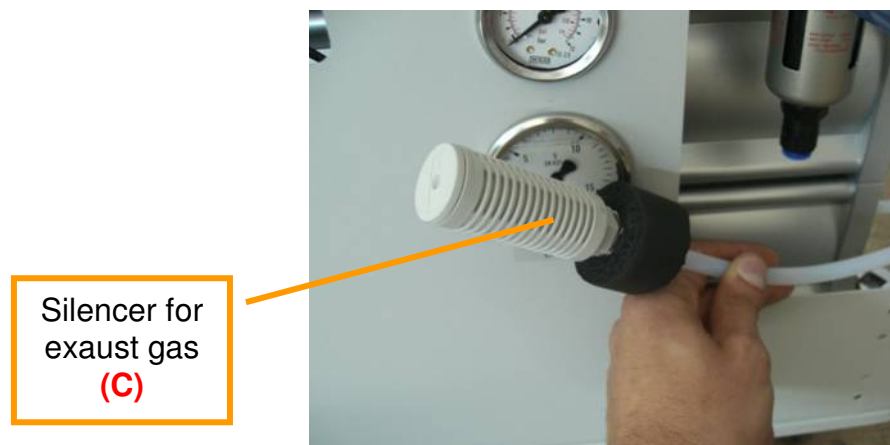


2. Exchange the silencer for outlet gas (C)

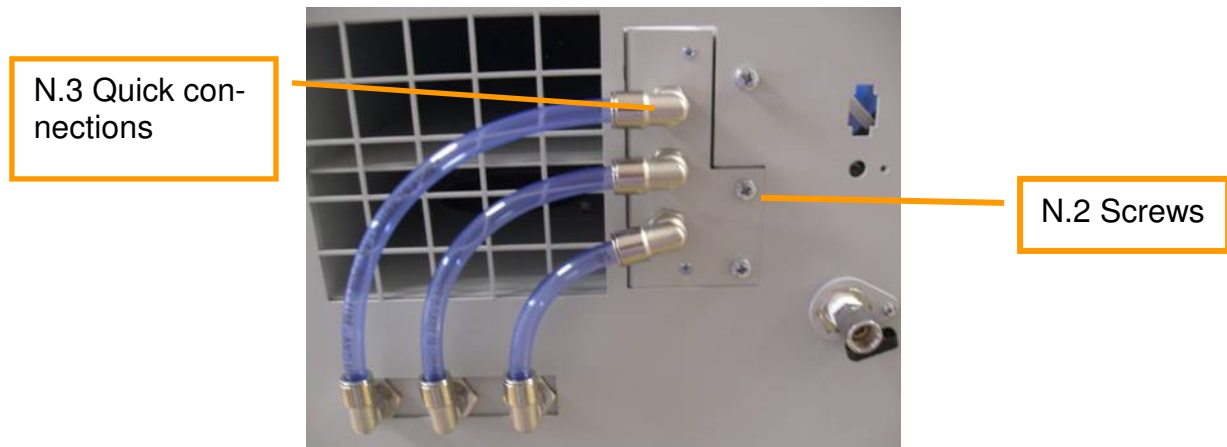
- remove the left plastic panel;



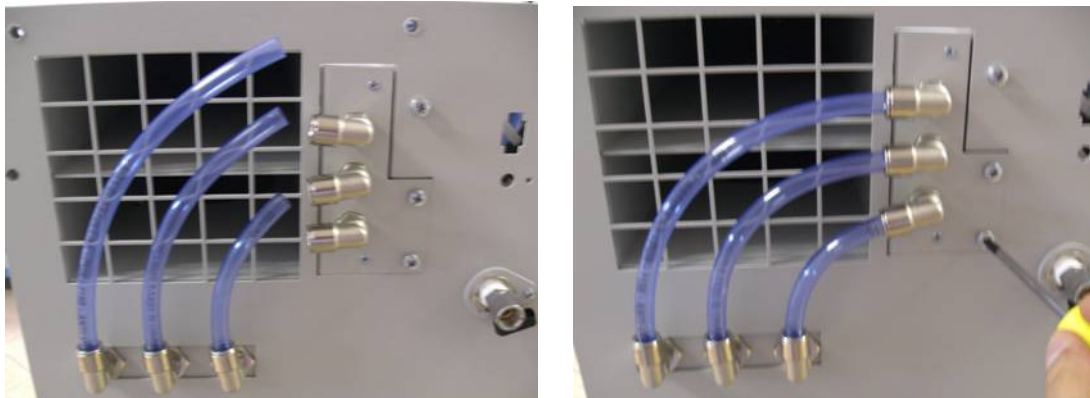
unscrew the silencer and replace it. Be careful and avoid to screw strongly the silencer;



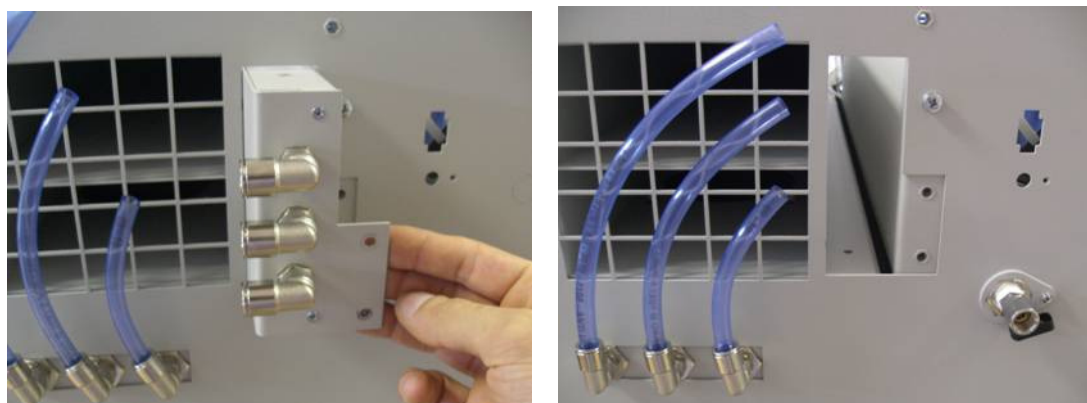
3. Exchange the inlet filter for atmospheric air (B):



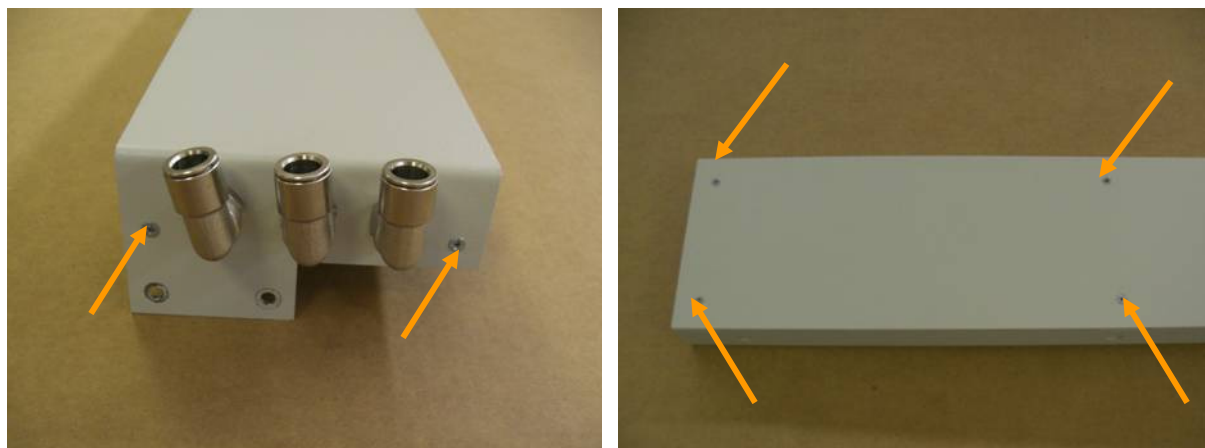
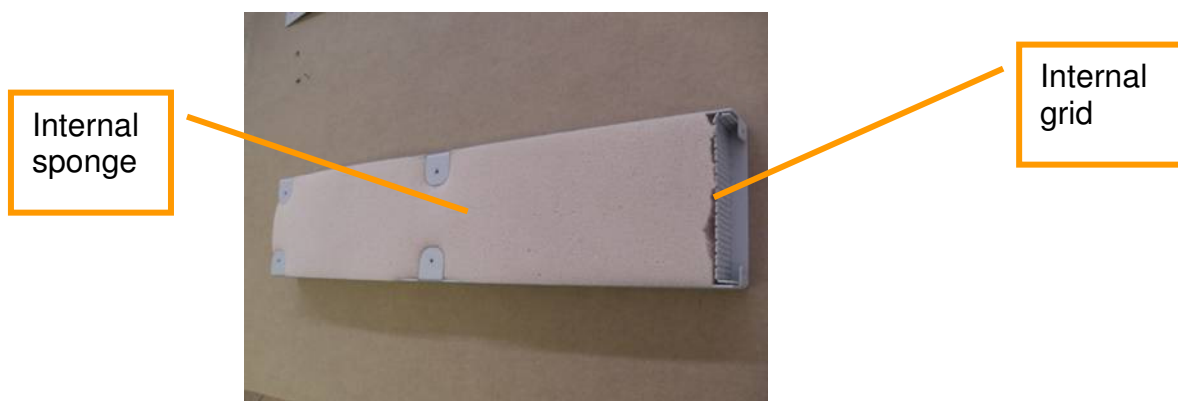
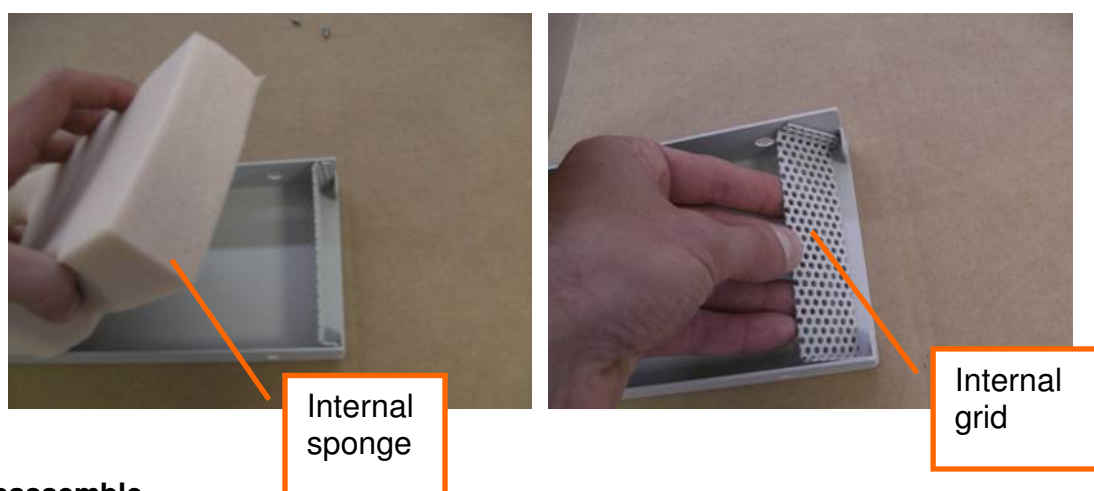
A) Disconnect the N.3 tubes and unscrew the N.2 screws:



B) Pull out the inlet filter:



C) Unscrew the N.6 screws of the filter element:

**D) Remove the cover:****E) Remove the internal sponge and substitute it and pay attention to place the grid in the right position:****F) Reassemble**

G) Reconnect the power line and switch on the unit. Enter the menu, go to the special functions and insert the number:

26103

This procedure resets the 4000 h work time counter.
Go to the main menu and press "Start".

The next service will be at 8000 h.

8000 hours service kit

-ask to service the code Z03-8000 for Zefiro 20/25/35/40

-ask to service the code Z06-8000 for Zefiro 8 HP

Every 8000 hours the user must replace some parts of the generator.

A specific maintenance kit is available as spare part. This kit includes all required parts.

Specifically, each kit includes:

- 1. New filter element for compressed air (A)**
 - 2. New inlet filter for atmospheric air (B)**
 - 3. New silencer for exhaust gas (C)**
- See the 4000 h service kit (the parts to substitute are the same of the 4000h service kit).
 - Reconnect the power line and switch on the unit. Enter the menu, go to the special functions and insert the number:

26104

This procedure resets the 8000 h work time counter.

Go to the main menu and press "Start".

The next service will be at 4000 h.

Spare parts list

The table below provides a list and description of the spare parts of the nitrogen generator.

List of the spare parts

| p/n | DESCRIPTION |
|----------|---|
| Z03-4000 | 4.000 hours maintenance kit |
| Z03-8000 | 8.000 hours maintenance kit |
| Z06-4000 | Only for Zefiro 8 HP |
| Z06-8000 | Only for Zefiro 8 HP |
| | |
| Z04-312 | N.1 Air compressor 230V / 50-60 Hz (LP) |
| Z04-332 | N.1 Air compressor 230V / 50-60 Hz (HP) |
| Z04-302 | N.2 Air compressors for Zefiro 8 HP |

IMPORTANT!

The manufacturer reserves the right to change or modify its products without prior notice.

Returning the unit

In the event of any faults or damage, first notify the agent or distributor who supplied the unit. Please also provide full details of the problem, including the model and serial number. Instructions will then be provided for the service or the return of the unit. If the warranty has expired, or the fault is due to misuse of the unit, all repair and shipping costs are to be paid by the customer. All other costs are borne by the customer, except as otherwise expressly agreed upon.

WARNING!

*If the unit has to be transported, make sure to use suitable packaging.
The unit should be transported in an upright position; this warning should be reported on the outside of the packaging.*

APPENDIX A

Removal of the compressors

First switch off the instrument and disconnect it from the power line

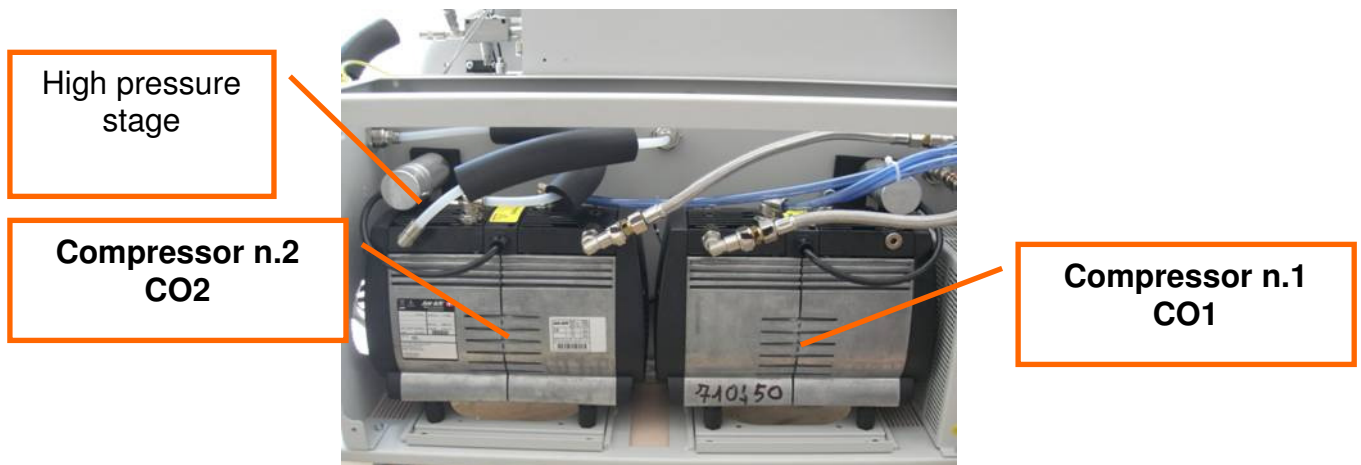


Because of the two compressor models are different, before open the box of the replacement compressors, check that the model number on the label of the box is different.

- Remove the right plastic panel and the removable sheet unscrewing the four screws;



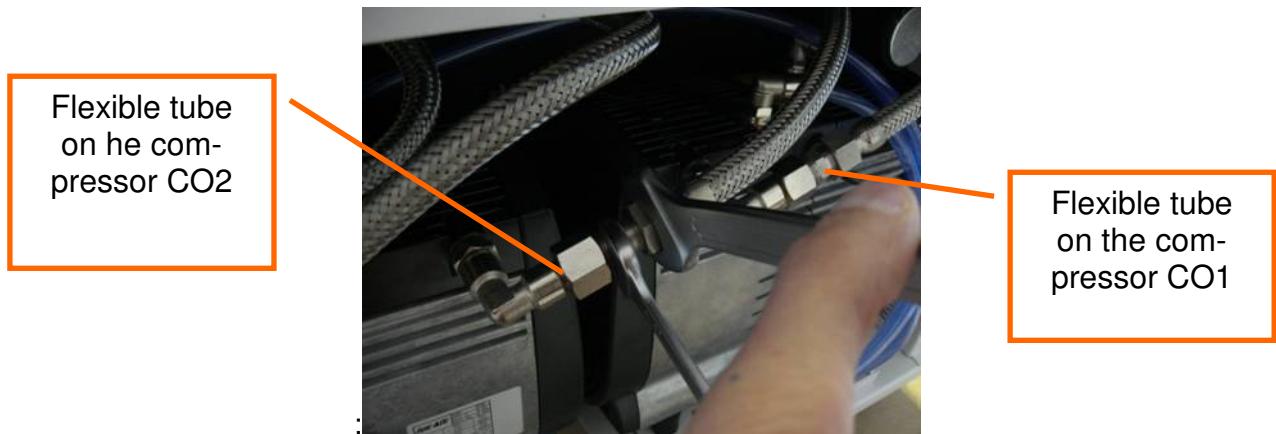
- Now is possible to see the two compressors;



For Zefiro 20/25/35/40 the compr. CO1 is the OF 312 (service kit code Z04-312)
For Zefiro 20/25/35/40 the compr. CO2 is the OF 332 (service kit code Z04-332)

For Zefiro 8 HP the compressor CO1 is the OF 302 (service kit code Z04-302)
For Zefiro 8 HP the compressor CO1 is the OF 302 (service kit code Z04-302)

- Disconnect the N.2 flexible tubes using spanners n. 17 and 20;



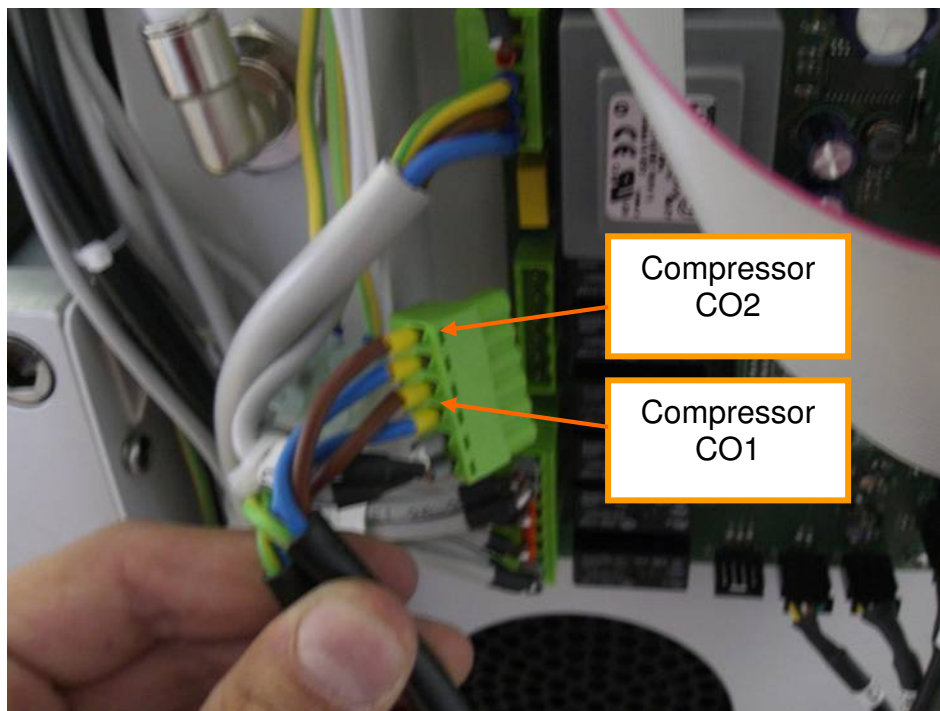
- Disconnect the N.3 air inlets of the compressors (Blue tubes). They are N.4 in Zefiro 8 HP;



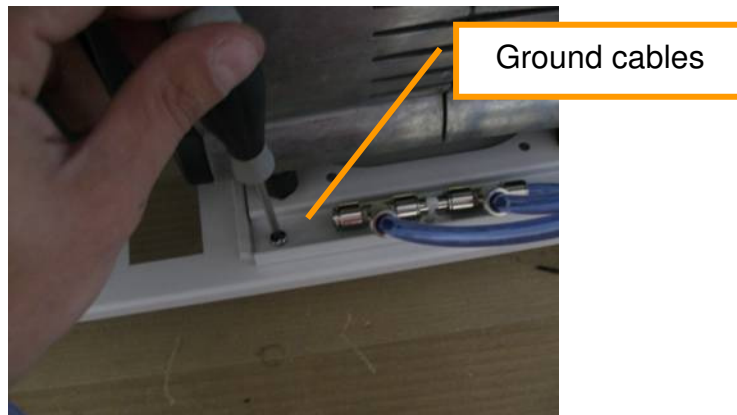
- Disconnect the N.2 tubes of the High Pressure stage (with tubes);



- Disconnect the alimentation cables of the two compressors from the main board using screwdriver;



- Disconnect the ground cables of the two compressors using screwdriver



- Unscrew the four screws of the two compressor's supports and remove them.



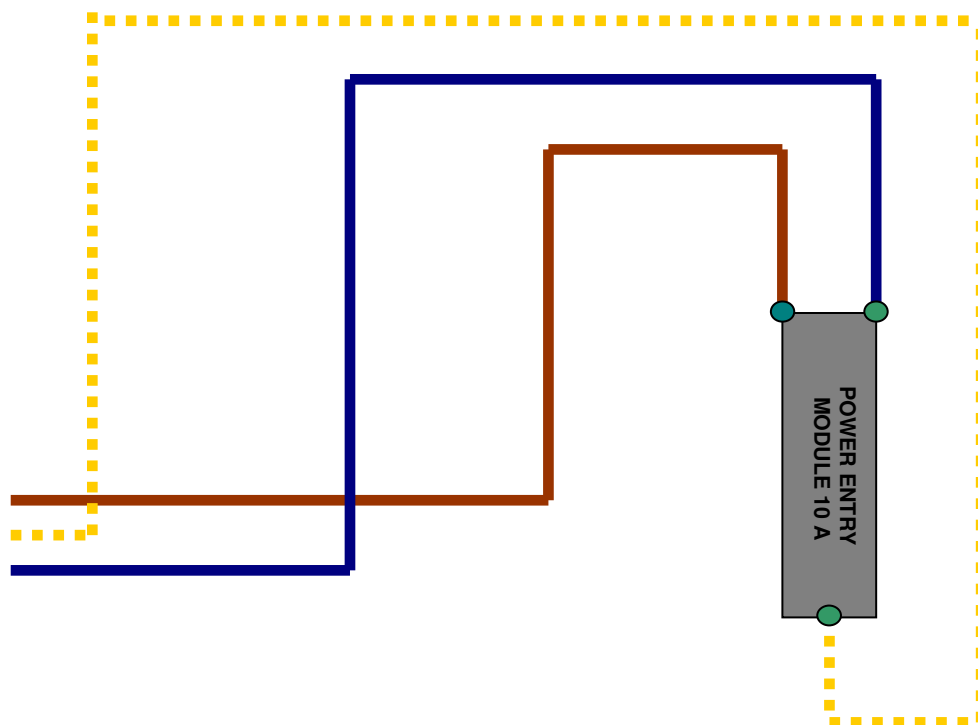
- For first remove the compressor CO2 and then the compressor CO1. Check the label on each compressor to be sure to replace it with the same model.
- Remount the compressors in the opposite order (first CO1 and after CO2).
- Enter the **menu**, go to the **special functions** and insert the number:

26101 to reset the timer of the compressor CO1

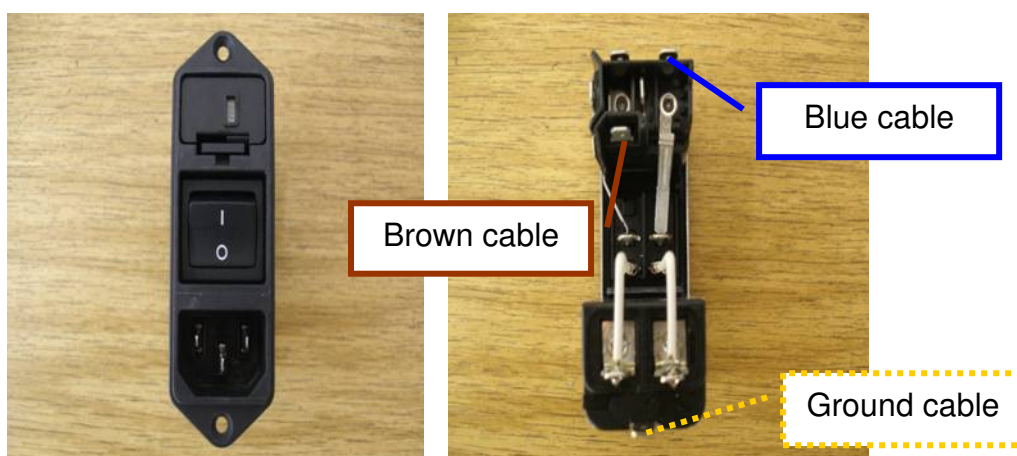
26102 to reset the timer of the compressor CO2

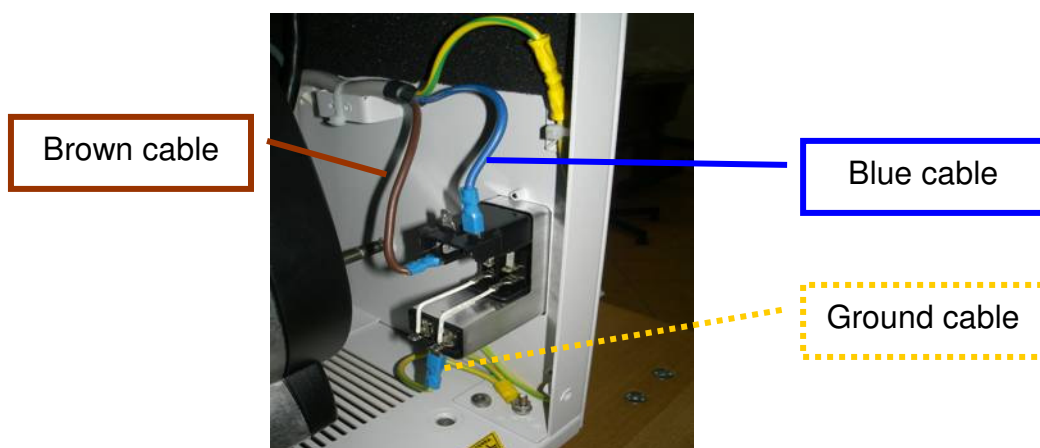
APPENDIX B

230 V power connections for Zefiro 40/35/25/20/8 HP:



Power entry (230 V):

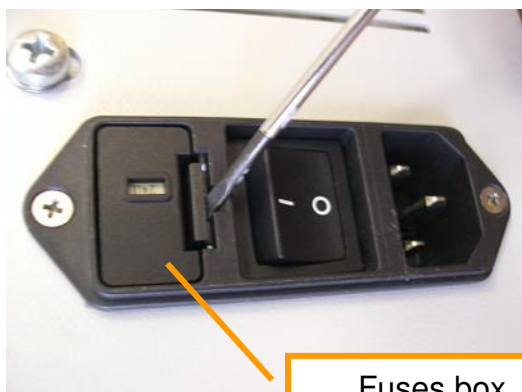




How to replace the fuse



First switch off the instrument and disconnect it from the power line



Fuses box

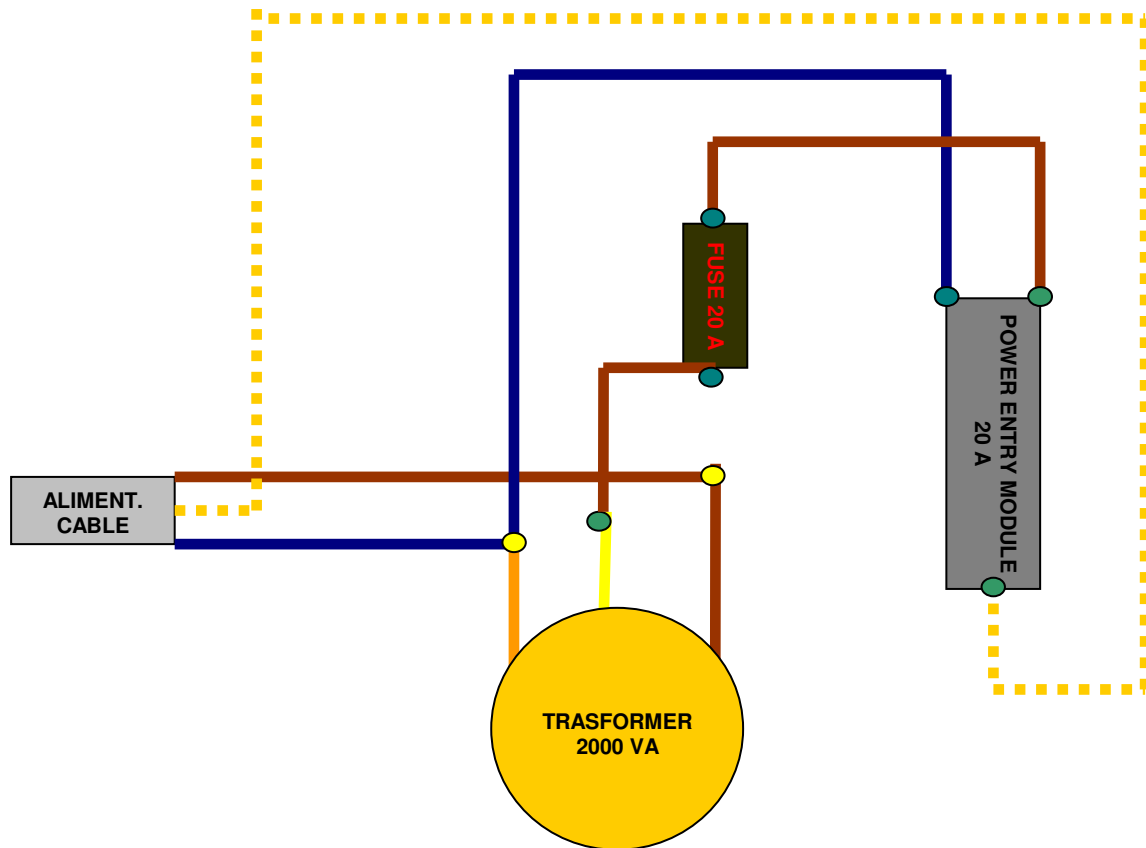


To open the
fuses box use
the screwdriver

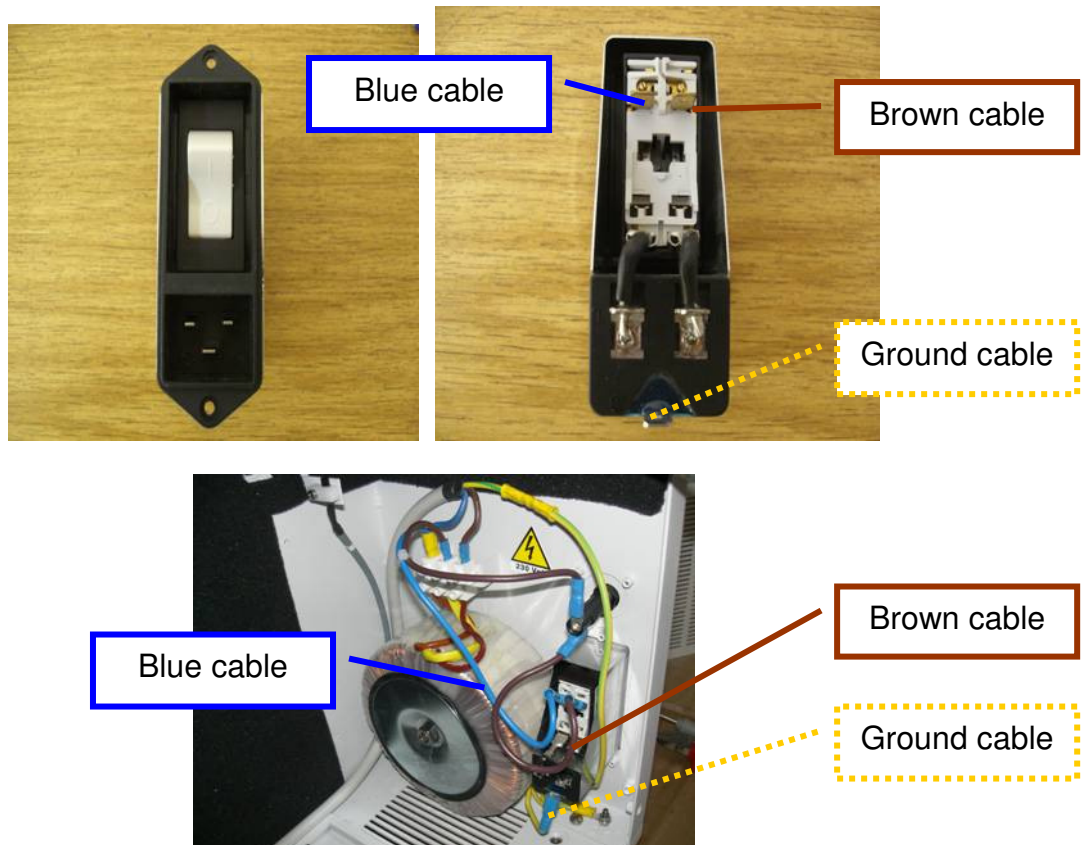
N.2 fuses 10 A
fast



110 V power connections for Zefiro 40/35/25/20/8 HP:

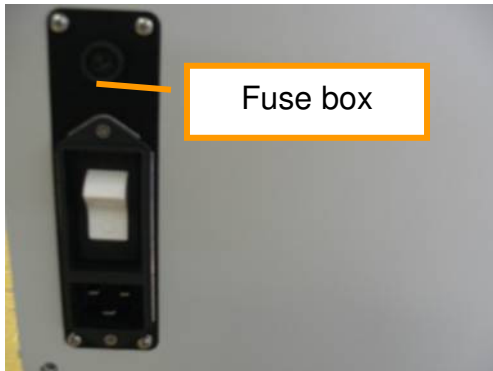


Power entry:



How to replace the fuse:

First switch off the instrument and disconnect it from the power line



N.1 fuse 20 A
fast